Dec 12th, 1:30 PM - 3:10 PM

Monitoring fish passage and fisheries at the Don Sahong dam site, Khone Falls, Mekong River, southern Laos

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Monitoring fish passage and fisheries at the Don Sahong dam site, Khone Falls, Mekong River, southern Laos

10 December 2018

Kent Hortle & Somphone Phommanivong
Don Sahong Power Company, Vientiane.

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Fisheries monitoring

Objectives

- Monitor fish passage.
- Monitor overall status of fishery and catches.
- Use results to inform adaptive management.

A large and complex system with multiple large channels, highly variable habitat, large-scale fish migrations.

Approaches are limited by gear restrictions and by habitat conditions.

Various methods are being used to obtain multiple complementary lines of evidence on fish abundance and fish passage success.

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Fisheries monitoring

1. Standardised fish sampling (CPUE) upstream and downstream in each channel and in fish passes; 2015-2018.
2. Daily catches of 60 households (HHs); 2009-2018.
3. Direct trapping/video monitoring of key locations.
4. Tagging.
5. Markets.
6. Fish larvae monitoring.
7. Others….

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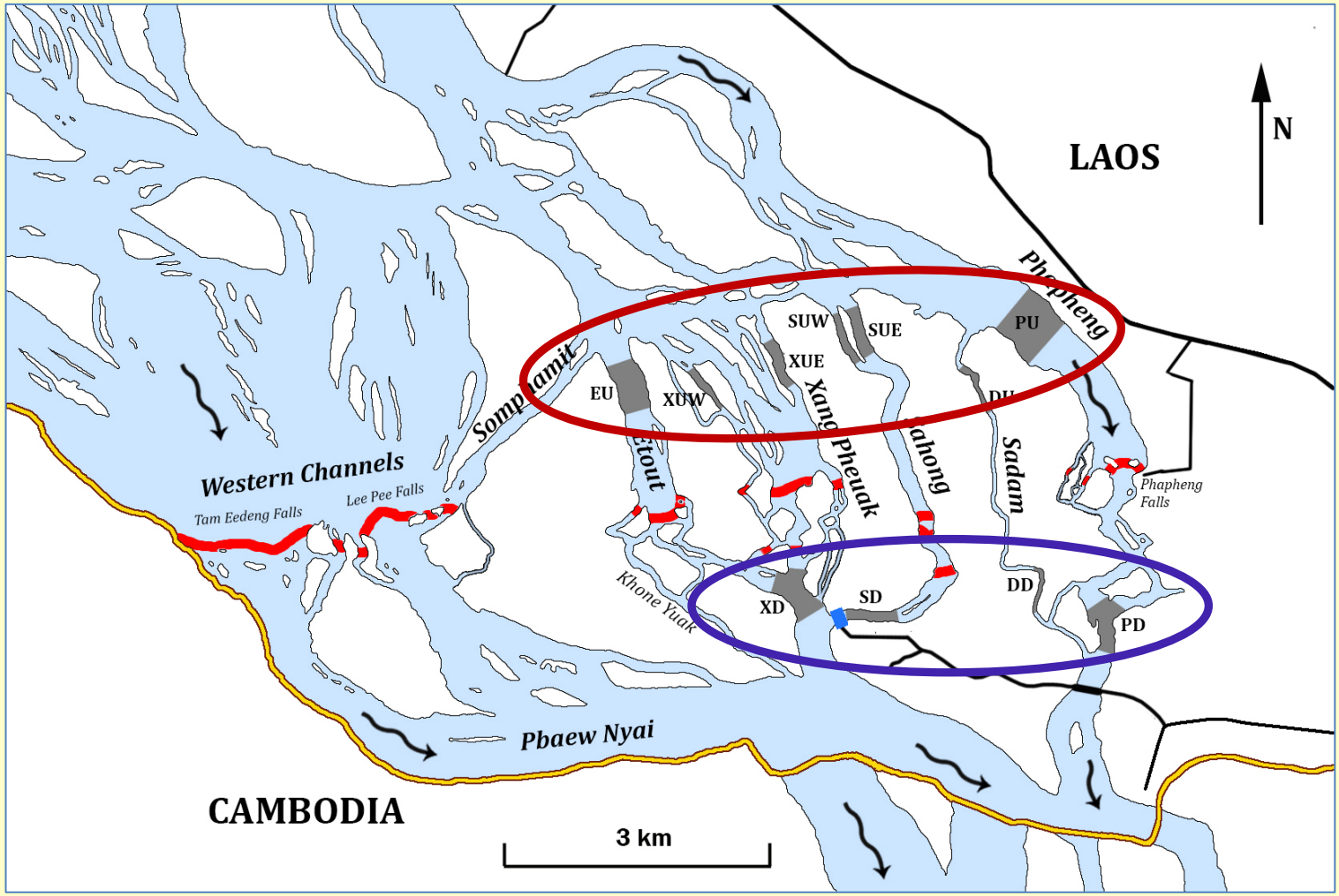
1. Sites for standardised (CPUE) sampling



- **Data is used for downstream-upstream comparisons by channel.**

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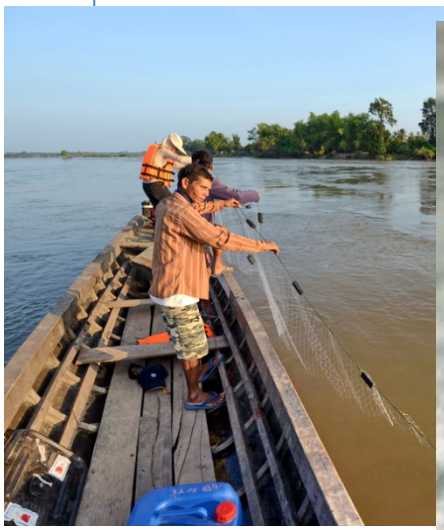
Methods for CPUE sampling

- Electrofishing & hydroacoustics not used.
- 15 local fishers hired full-time
- Methods developed in 2014 from local methods
- Gill nets, cast nets and traps
- Daily sampling in 2015, then once every 3 days.



- Gear must ‘fit’ habitat.
- Most effective in dry season.
- Dry season most relevant for fish passage.

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1. CPUE fish processing

- Fishers trained and tested
- All fish individually measured
- All samples photographed

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Photo-documentation

- **Check any outliers or data which show large or unusual species.**

Photo-documentation

- **Easy to check records for exotic species and confirm ID and size**

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Several new records or rare species for Laos

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Open access for visitors

- MRC Nov 2016 on site visit; many visitors

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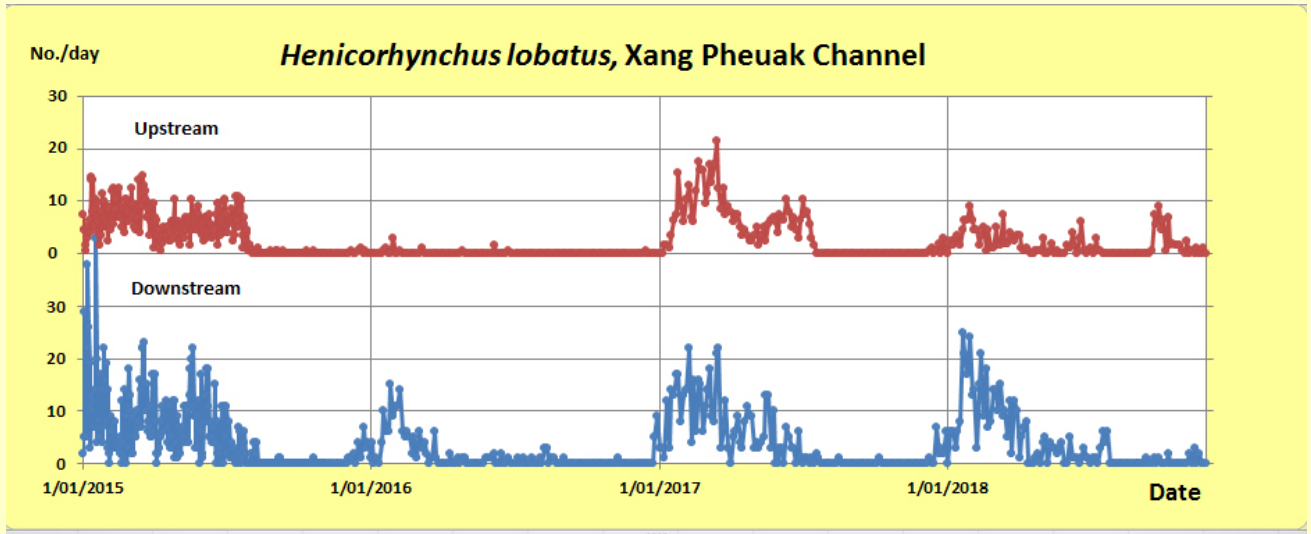
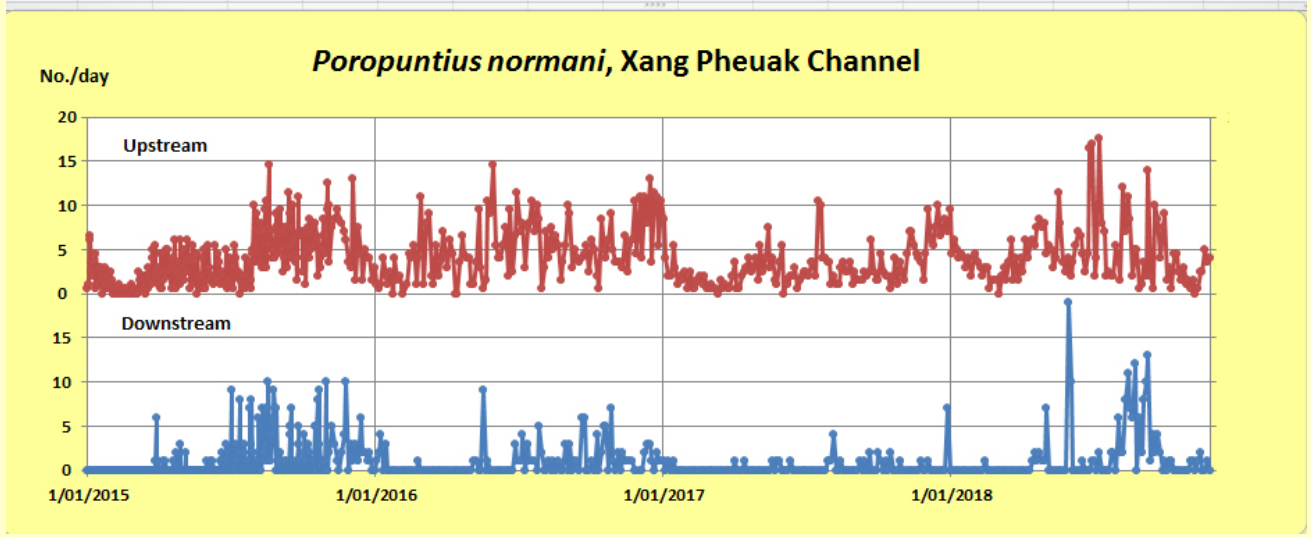
CPUE, mean daily catch example

Highly migratory



"Resident"



- **Fish catches depend upon flood size in previous wet season.**
- **Dry season water levels affect fish migration.**
- **Fishers catch or interfere with migrating fish.**

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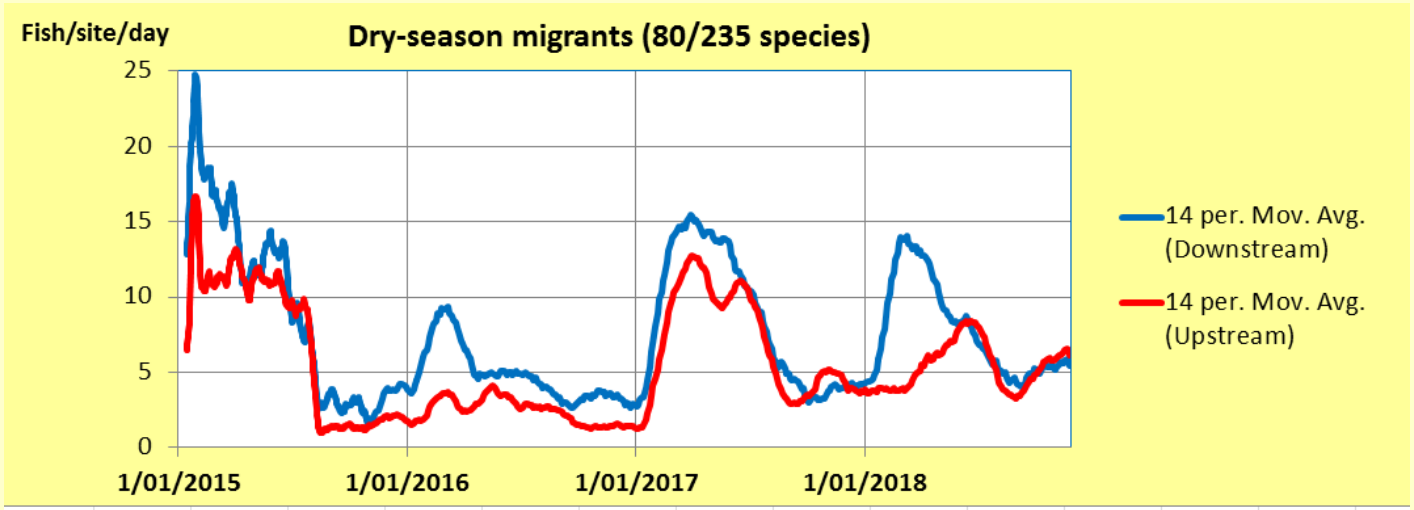
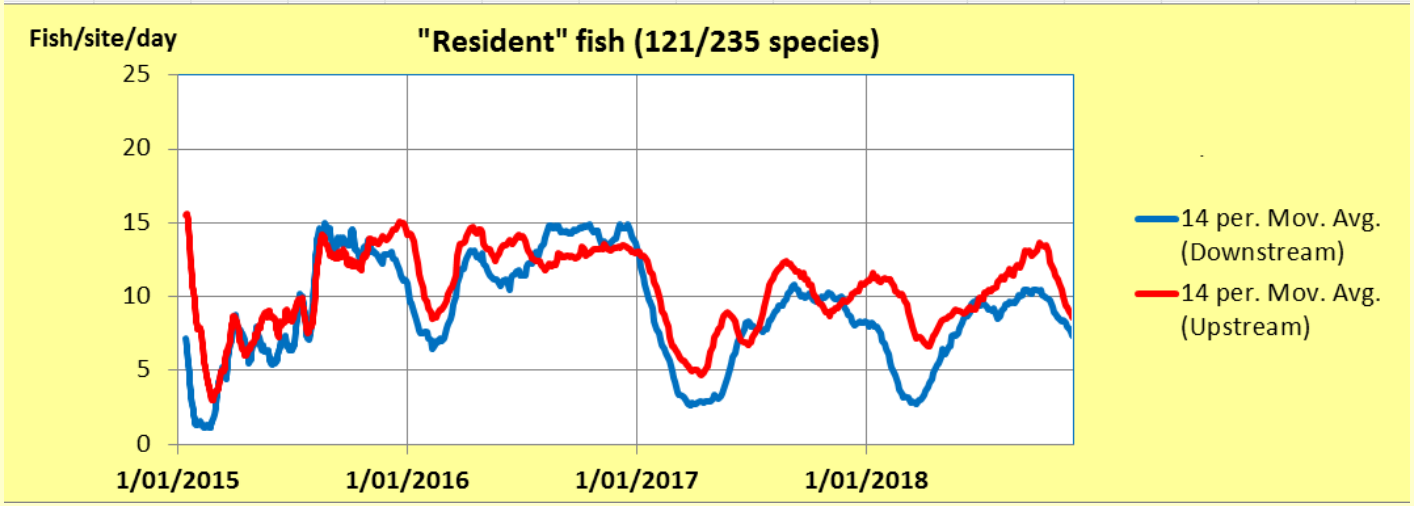
CPUE, DS migrant vs “resident” fish groups





- **Inter-annual and upstream/downstream differences apparent.**
- **Fewer migratory fish upstream, fishing pressure, passage, habitat.**
- **Fishers catch or interfere with migrating fish.**

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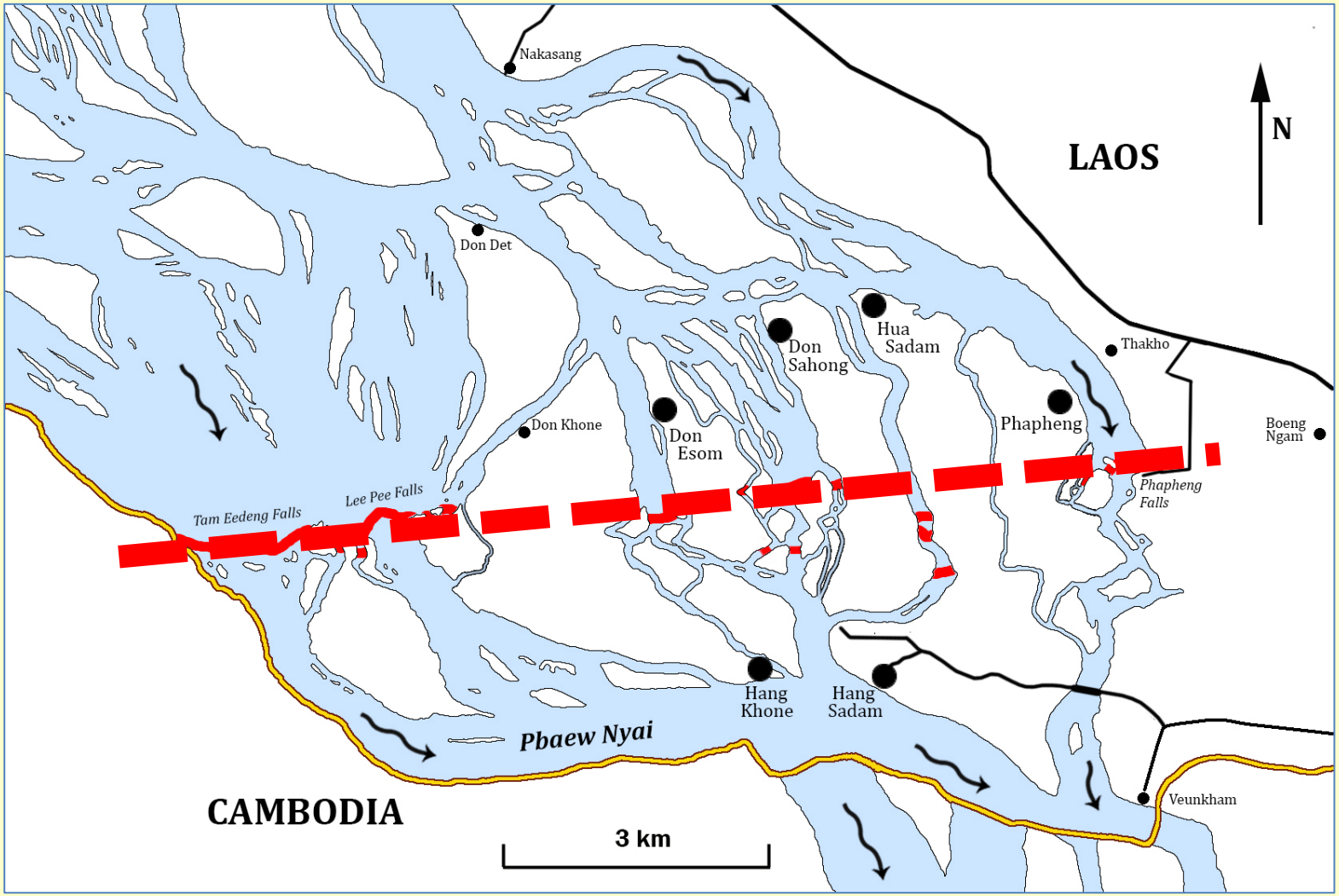
2. HH Catch monitoring



- 6 Villages, 60 HHs, 349/397 88% fishing

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2. HH catch monitoring

- Gill nets are the most common gears now

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- Cast nets 2nd- most common gears now

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- Families target migrating fish at barriers.

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Anguilla marmorata 2 Dec 2018, 2.3 kg

- Category 1 Protected Species in Laos

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Hemitrygon laosensis **21-Oct-2017 250 kg**

- Category 1 Protected Species in Laos

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Urogymnus polylepis 2018-3-24, 290 kg

- Category 1 Protected Species?

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- Training and checking HHs in villages.

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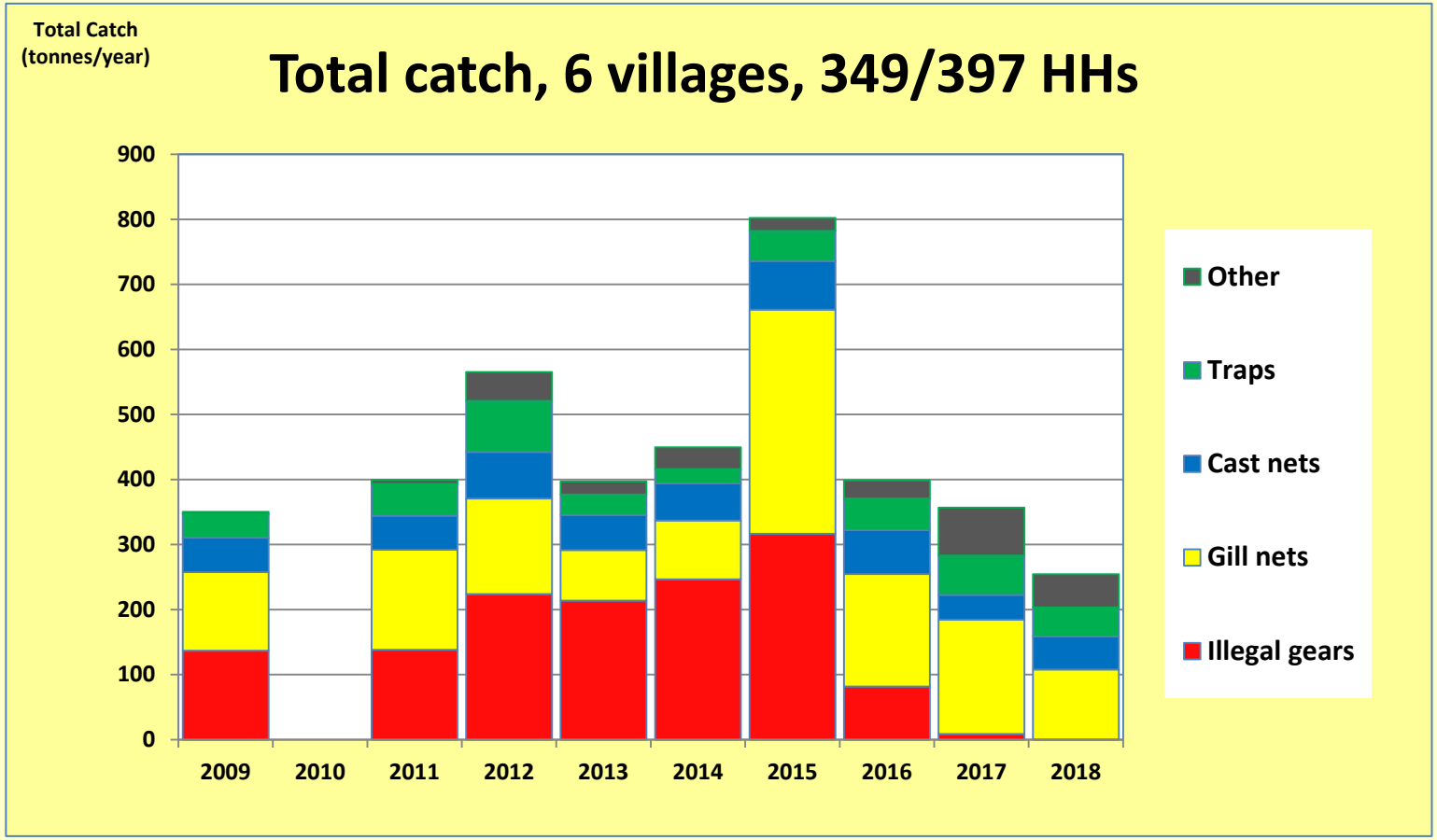
Household catches by gear 2009-2018



- 2015 high-catch year followed 2011 large-flood year, & increased effort.
- Removal of illegal gears caused some catch declines since 2015
- Employment in construction and associated businesses since 2015 has reduced manpower for fishing, affects effort.

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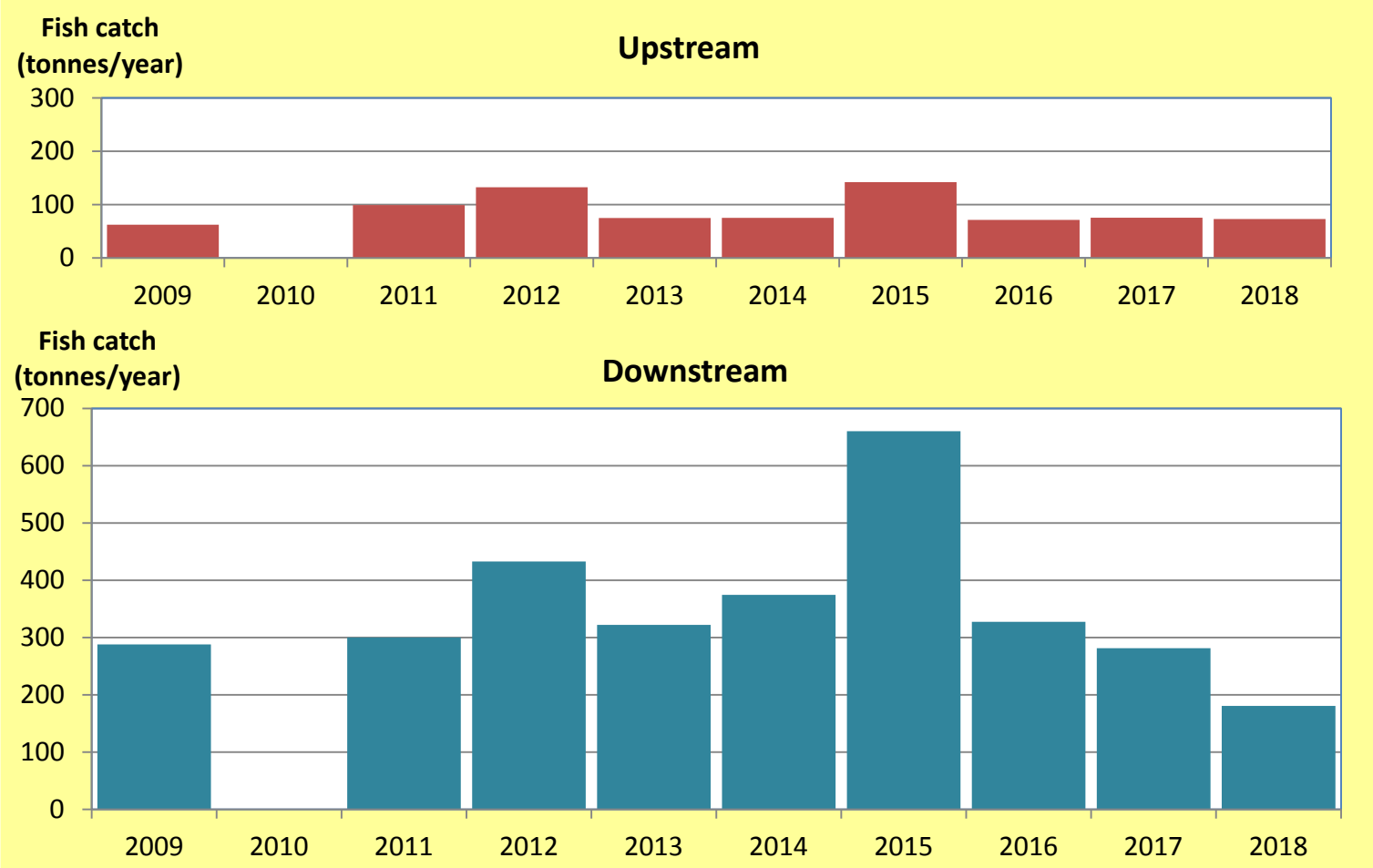
HH catches 2009-2018 upstream/downstream



- Change in 2016 is due to loss of big gears and Sahong downstream.
- Upstream catches are relatively constant, appears as if no effect of SH loss.

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3. Trapping/video monitoring in fish passages

- In the dry season (Jan-April) fish can be seen moving upstream through the fish passages and feeding within them.
- Fences divert fish so they accumulate within a trap.
- Fish are collected, anaesthetised, measured then released.
- If many fish enter the trap, a gate is opened and fish pass a video recorder. They are identified and counted from the video. Sizes are estimated from subsamples.
- Not very feasible May-Dec, or in large channels.

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Video monitoring site Xang Pheuak Noi

- Small channel, indicative of much higher passage rates in larger channels

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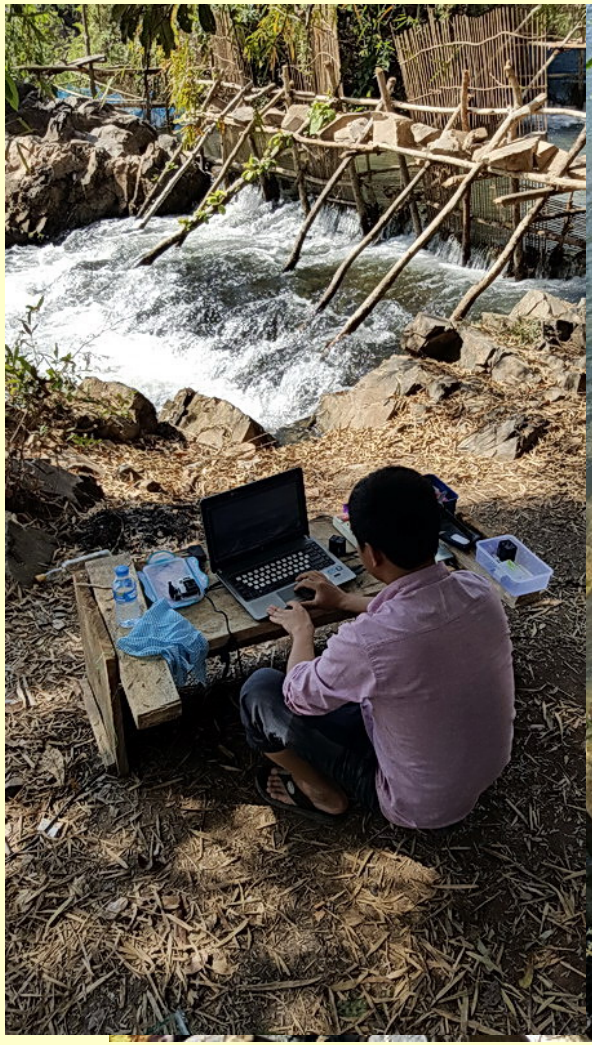
Video setup at XPN



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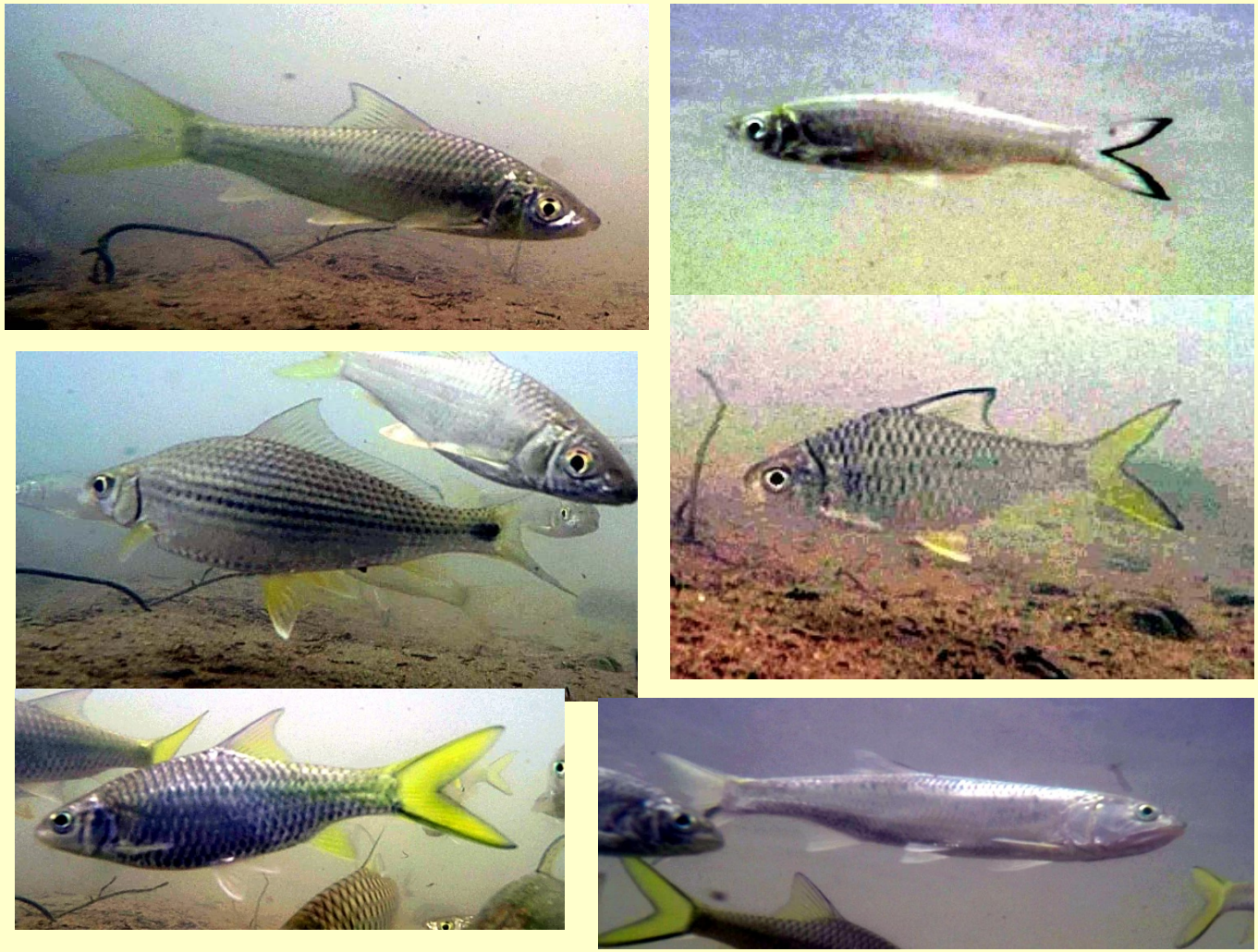
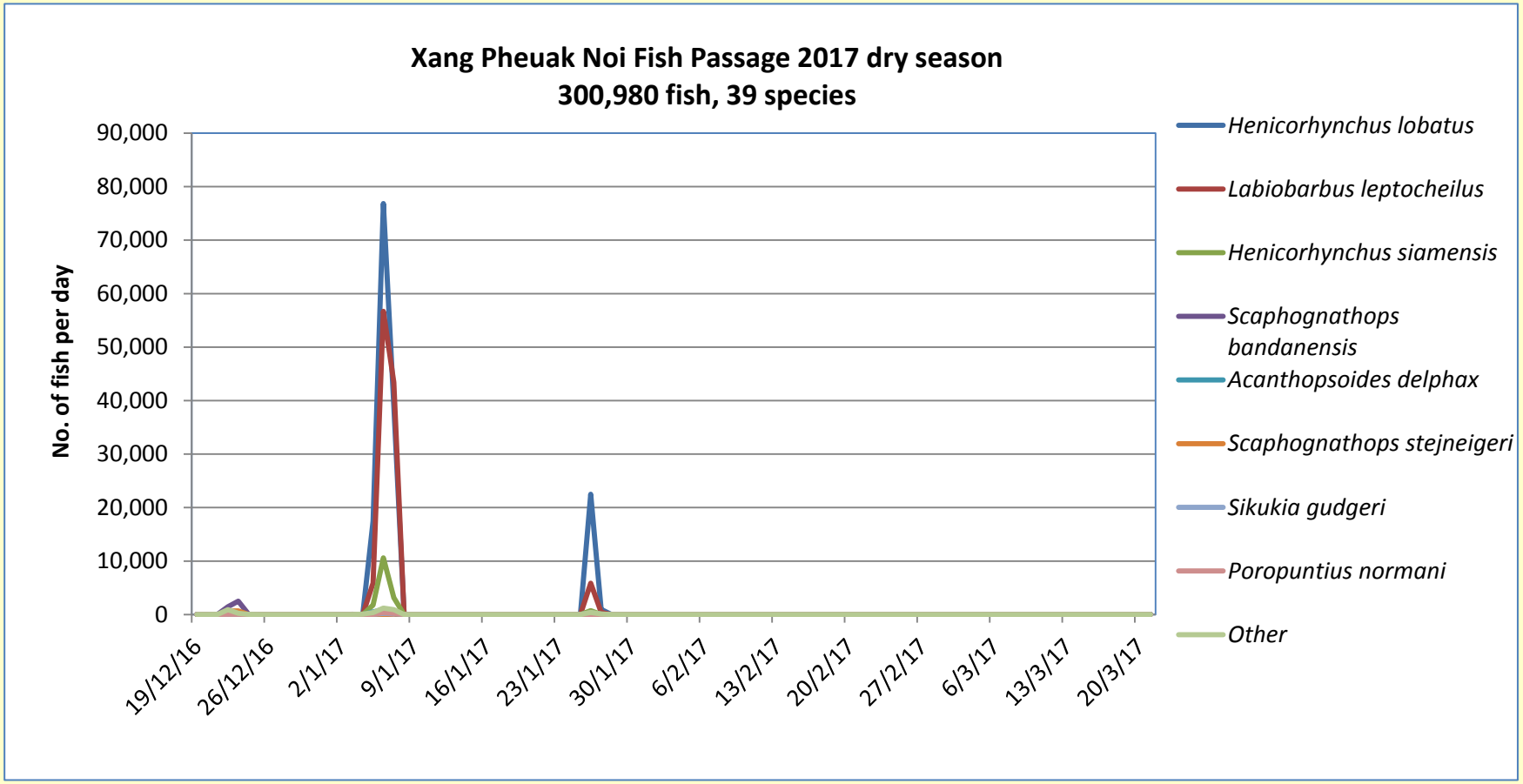
Screenshots from video camera

Fish in trap.mp4

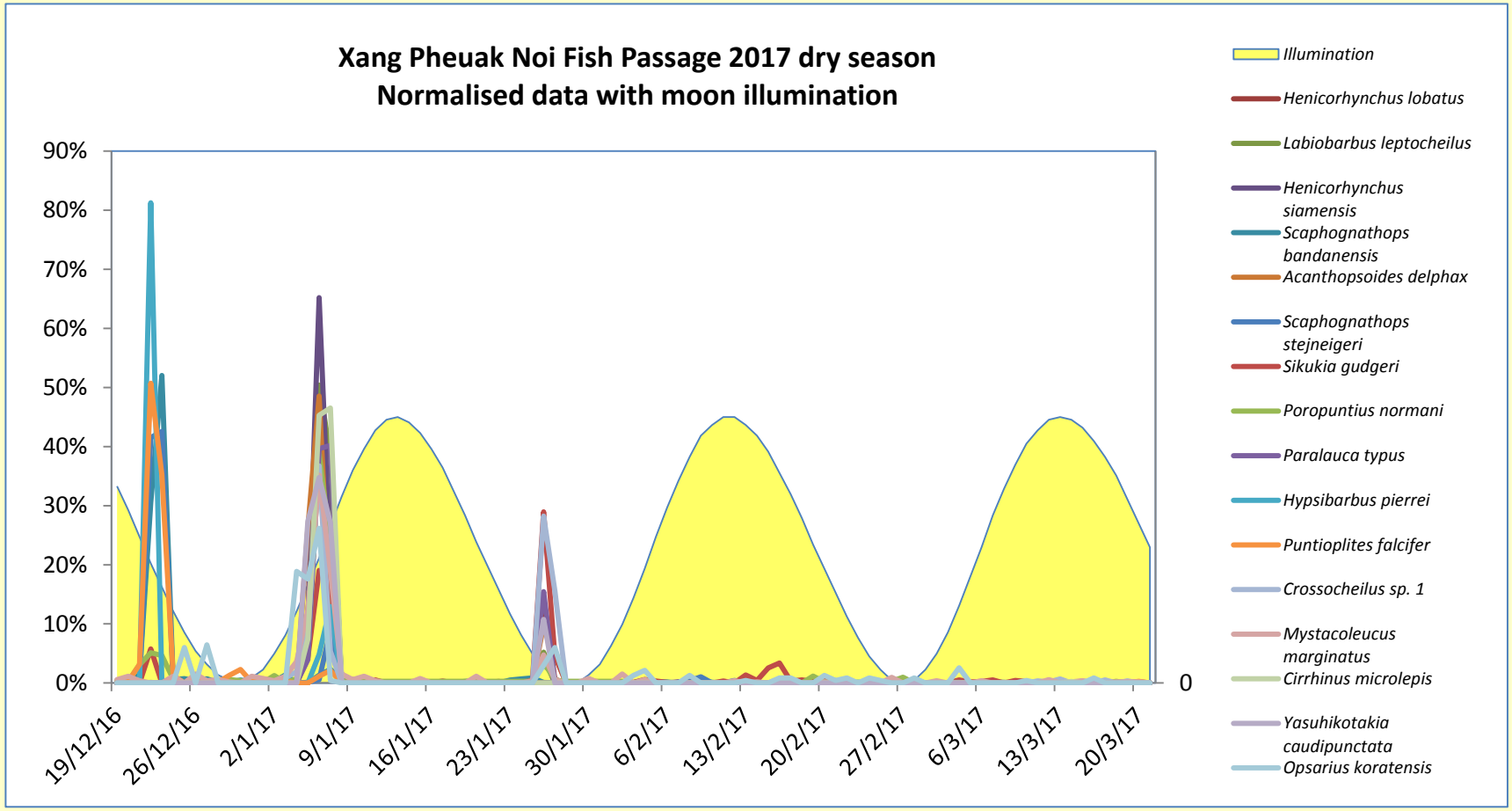


XPN fence trap 2017



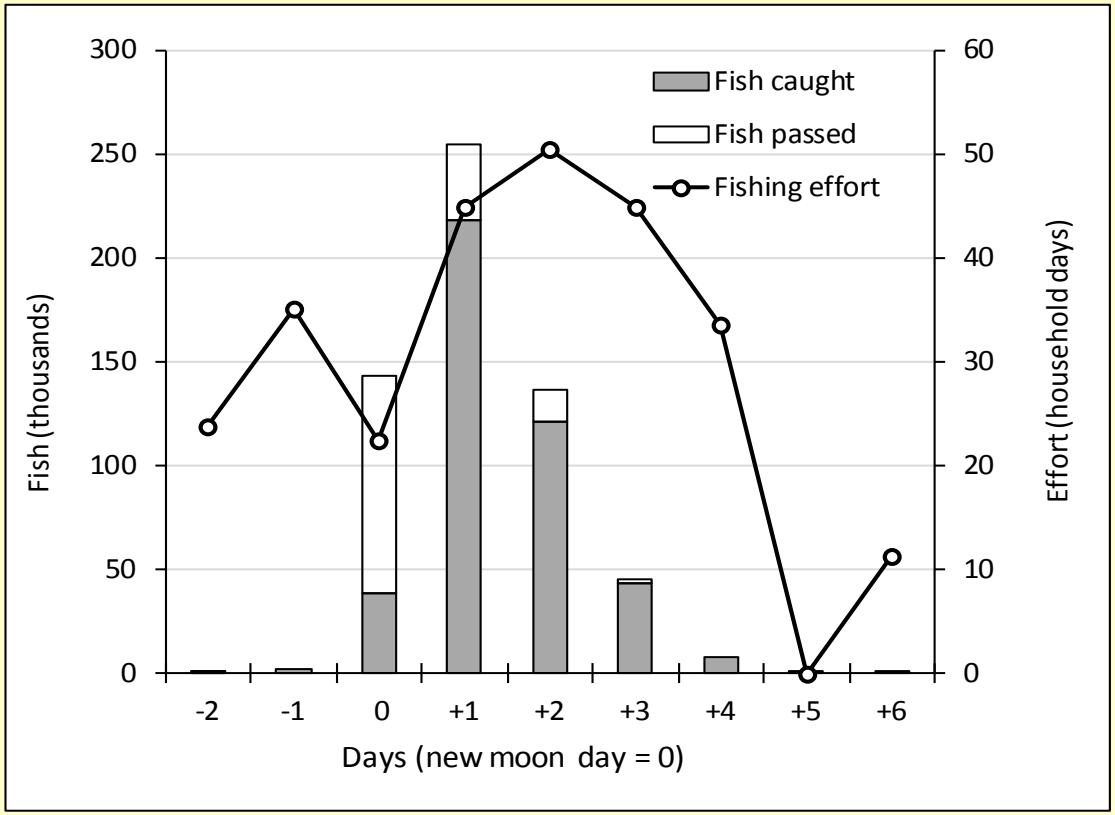
- **Most fish pass over short periods.**
- **90% of individuals in just 2 species**

XPN fence trap 2017



- **Peak migration days are not predictable now.**

Fish passage through Sadam Channel, 8 days in January 2015



- 570,000 fish migrated; 450,000 or ~80% were caught, ~ 120,000 fish passed upstream through the channel
- Fishers have a big impact on passage efficiency

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4. Market surveys

- Daily logbook monitoring at 2 markets and interviews at others.
- Markets show the main trends in fish quantity and prices.

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Pakse Market, June 2017



- Many migratory fish from upstream of DSHP

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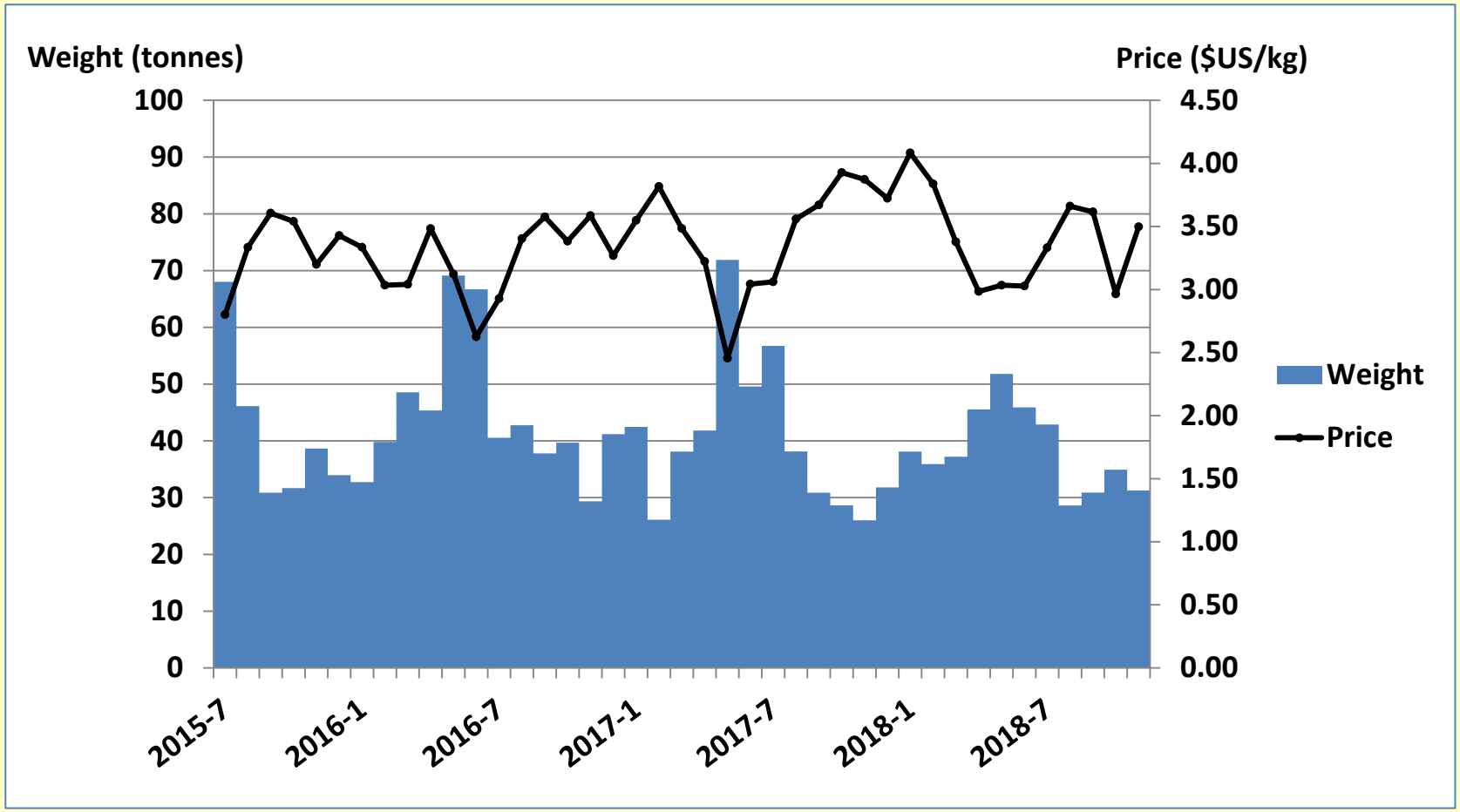
Nakasang & Veunkham Market
Monthly Fish Sales 2015-2018



- Inverse quantity/price correlation.
- Only slight trends over time, lack of major regional changes over this short time frame

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5. Fish tagging 2014-2015

Aim was to track fish movement up channels

External tags with unique codes, read visually

- Fish may not be re-captured or tags may not be returned by fishers.
- Pathway of migration not unequivocally proven.

We tagged about 1053 fish in 49 species and 10 families, with 74 returns. Most were near release site. Some moved up the channels

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6. Downstream – larval sampling

June 2013 – September 2014

- Determine larval drift density and load over time.
- Model the likely proportion passing downstream through the power plant.
- Estimate proportion affected by passage through the plant.

- Most larvae are very small.
- 2 peaks in drift in July.
- Larvae are well-mixed in river.
- Most will not go through the DSHP.

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Summary

- CPUE sampling is useful especially in the dry season; this is the first large fisheries-independent monitoring data set in the Mekong.
- Households catch larger fish and wider range of species, but data is not as accurate and effort is not consistent, controlled nor easily quantified.
- Wet season flooding has major effects, evident in the data.
- Many fish are migrating through alternative channels . No evidence for major effects of Sahong Channel closure; perhaps because of increased dry season flows, GoL gear removal and the DSPC fish passage improvements.
- Downstream fish passage is likely to be relatively efficient, but some issues remain.
- Various other data collection.
- Starting data collection early and maintaining consistency is critical to drawing any conclusions about long-term effects.

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